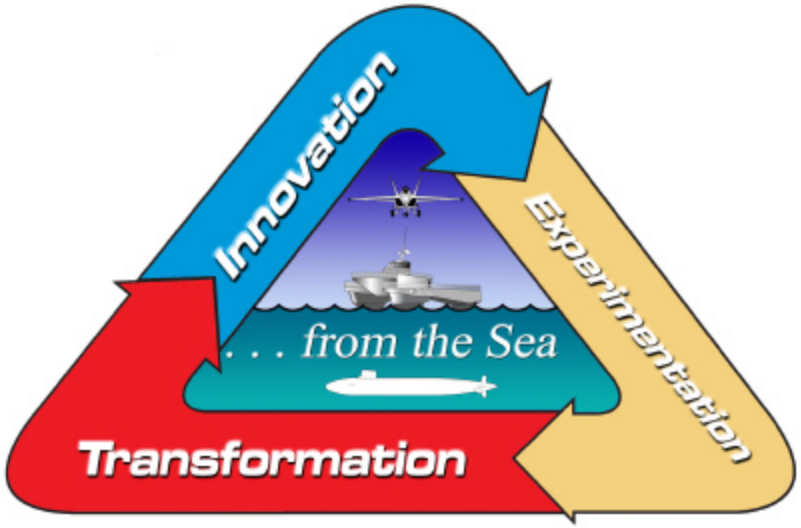
NDIA Science & Engineering Technology Conference

Challenges in Transformation: Navy S&T Investment



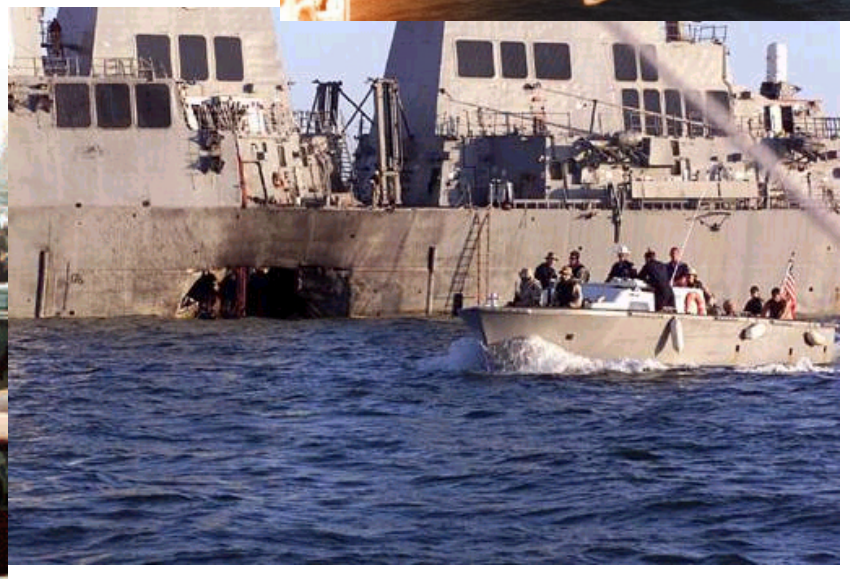
CAPT David M. Schubert
Assistant Chief of Naval Research

07 February 2002

http://www.onr.navy.mil

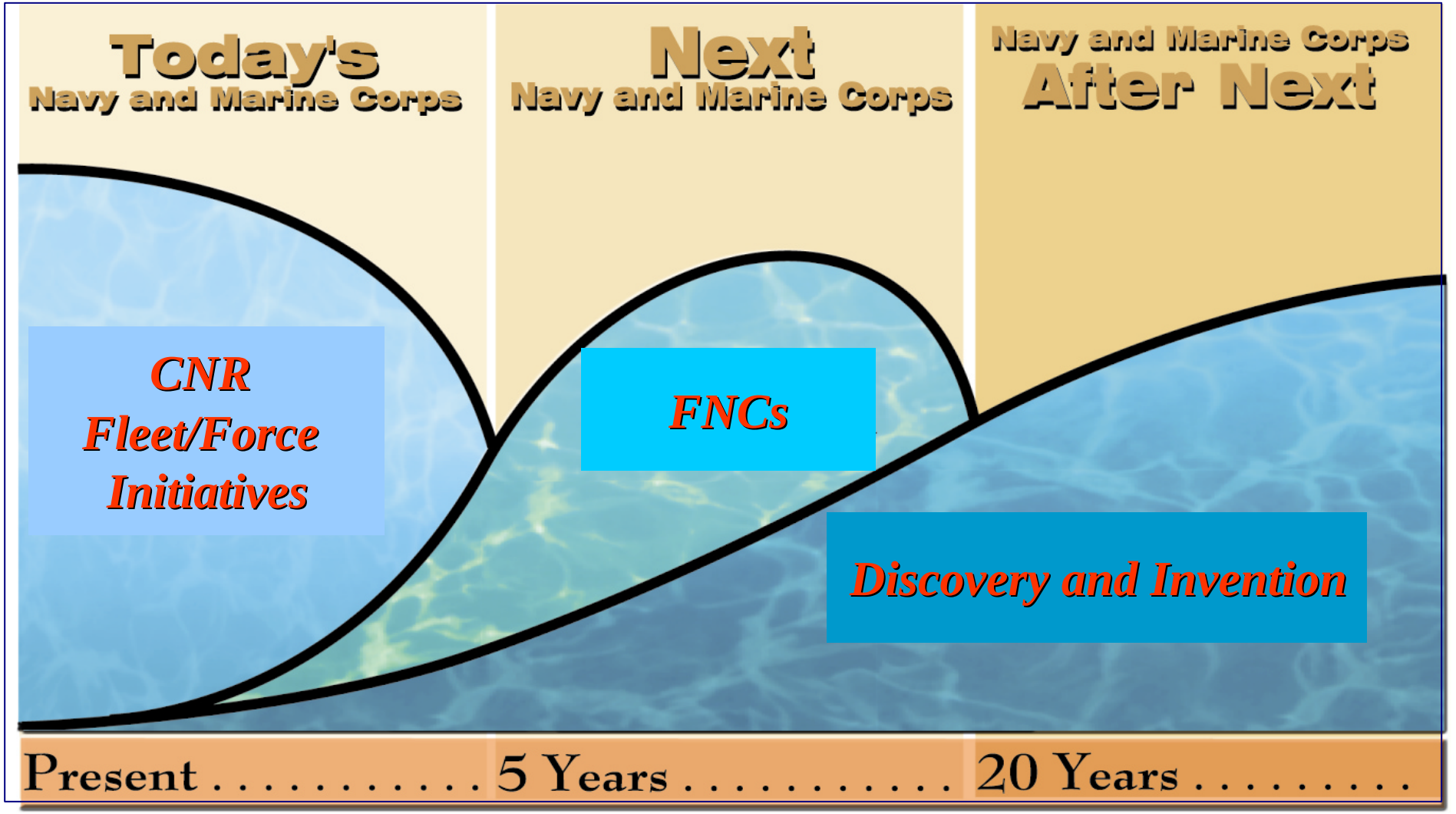
Trends in Defense S&T

- Challenge: Shifting, Asymmetric Threats
- Response: Greater RDT&E Investment
- Sources:
  - Hart-Rudman Commission
  - Quadrennial Defense Review
  - Rumsfeld Review



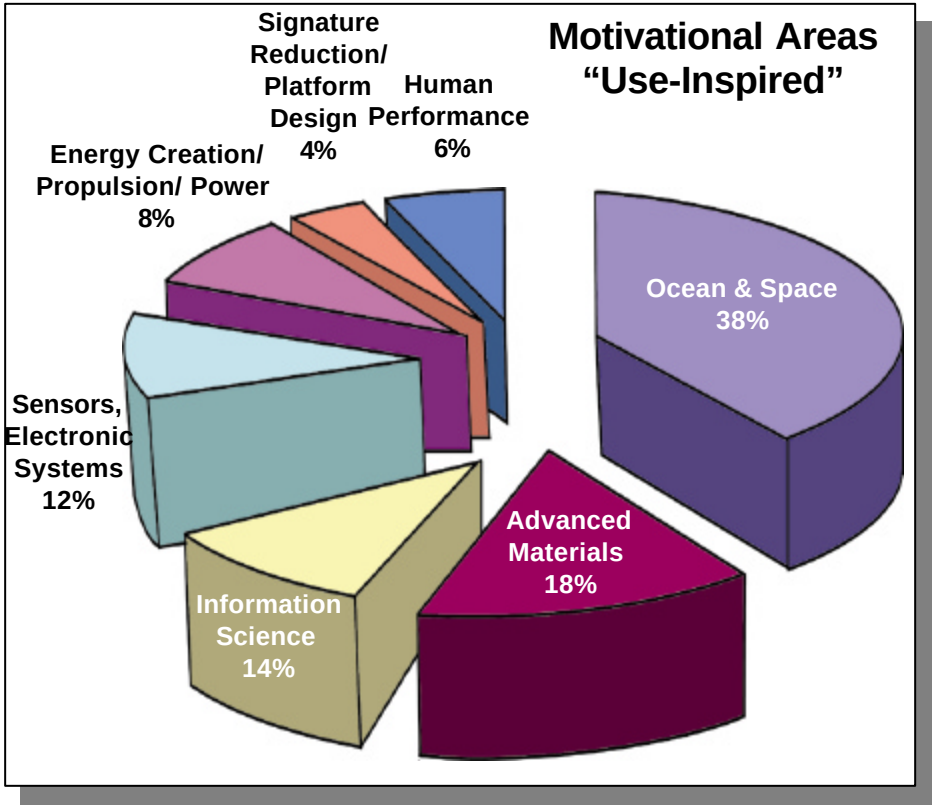
The Way Ahead for Naval S&T

…a look at tomorrow through the porthole of today...



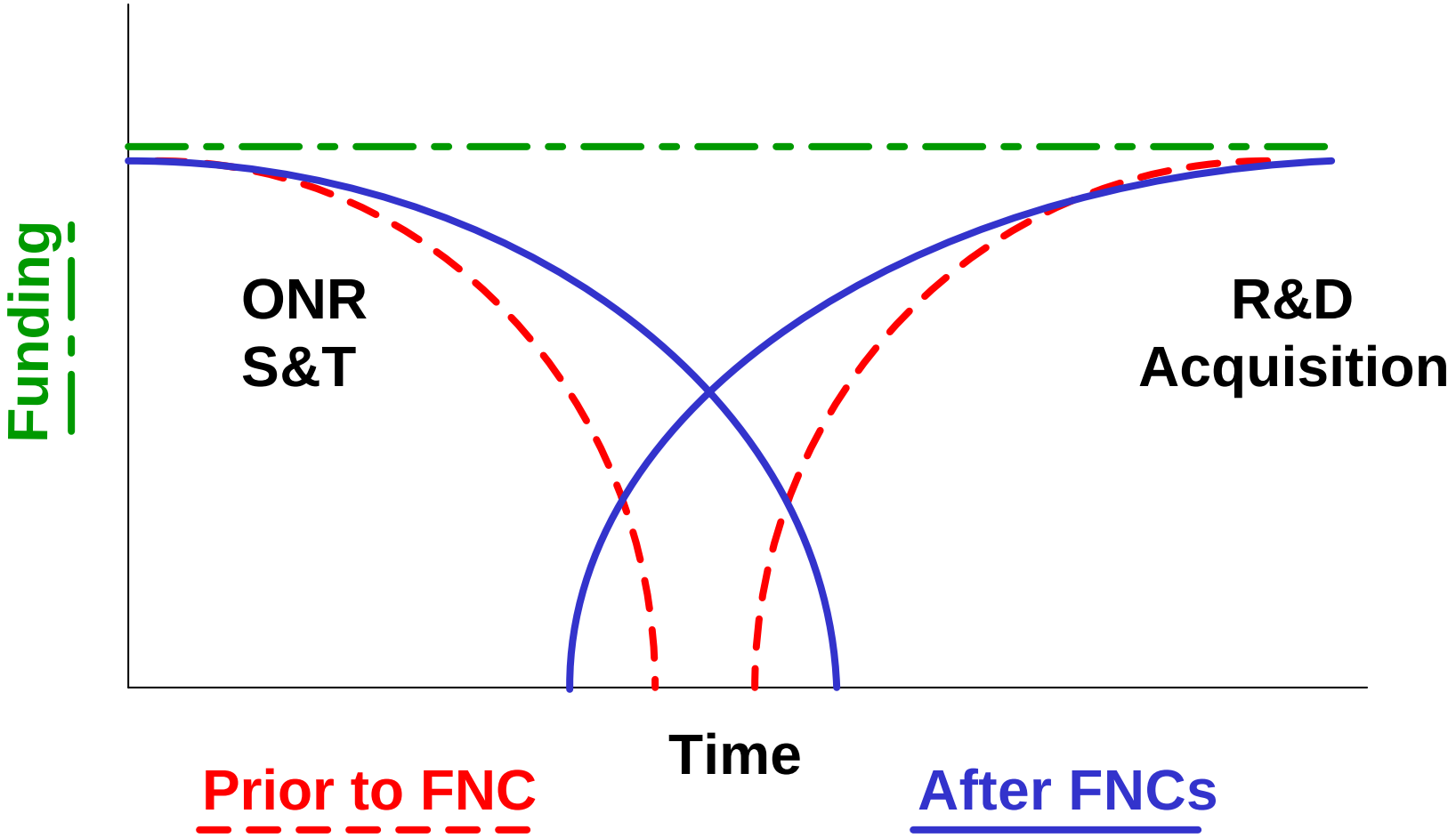
DoN Basic Research Investment

- **What it is:**
  - **Directed by knowledgeable program officers**
  - **Use-Inspired Naval Grand Challenges, National Naval Responsibilities, Awareness Programs**
    - **Naval-focused, needs-driven…relevant**
    - **Vertically integrated**
    - **Risk-taking to seek breakthroughs**
    - **Productive**
- **What it isn't:**
  - **Curiosity-driven**
  - **Selected by committee**
  - **Stagnant**



Awareness, Responsibility, Challenge

“Technology Valley of Death”



The Future Naval Capabilities

- **Knowledge Superiority & Assurance**
- **Time Critical Strike**
- **Organic MCM**
- **Autonomous Operations**
- **Littoral ASW**
- **Electric Ships & Combat Vehicles**
- **Total Ownership Cost**
- **Platform Protection**
- **Missile Defense**
- **Littoral Combat & Power Projection**
- **Capable Manpower**
- **Warfighter Protection**

ONR: TECH SOLUTIONS

Get on-line . . . Not in line

https://donst.nrl.navy.mil/donst/

TECH Solutions Powered by Naval Research — Inquiries received from Fleet/Force.

↓

Naval Research Enterprise — Reviewed by NRE, ONR, and Science Advisor

↓

NRE Reverse Auction — RFP posted for bid by NRE members

↓

Proposals Submitted & Evaluated — Evaluation Board (TBD) awards based on best-value

↓

Contract Award — Metrics used to track performance and project completion

CNR plans $5-10M/year to address Fleet/Force concerns

Plan of Action

Date	Event	Complete
8 Jan-30 Apr	"Tech Solutions" Pilot Project	30 Apr 01
May - Sep	Review & Implement Improvements	15 Sep 01
1 Oct	Formally Introduce To Entire Fleet/Force	

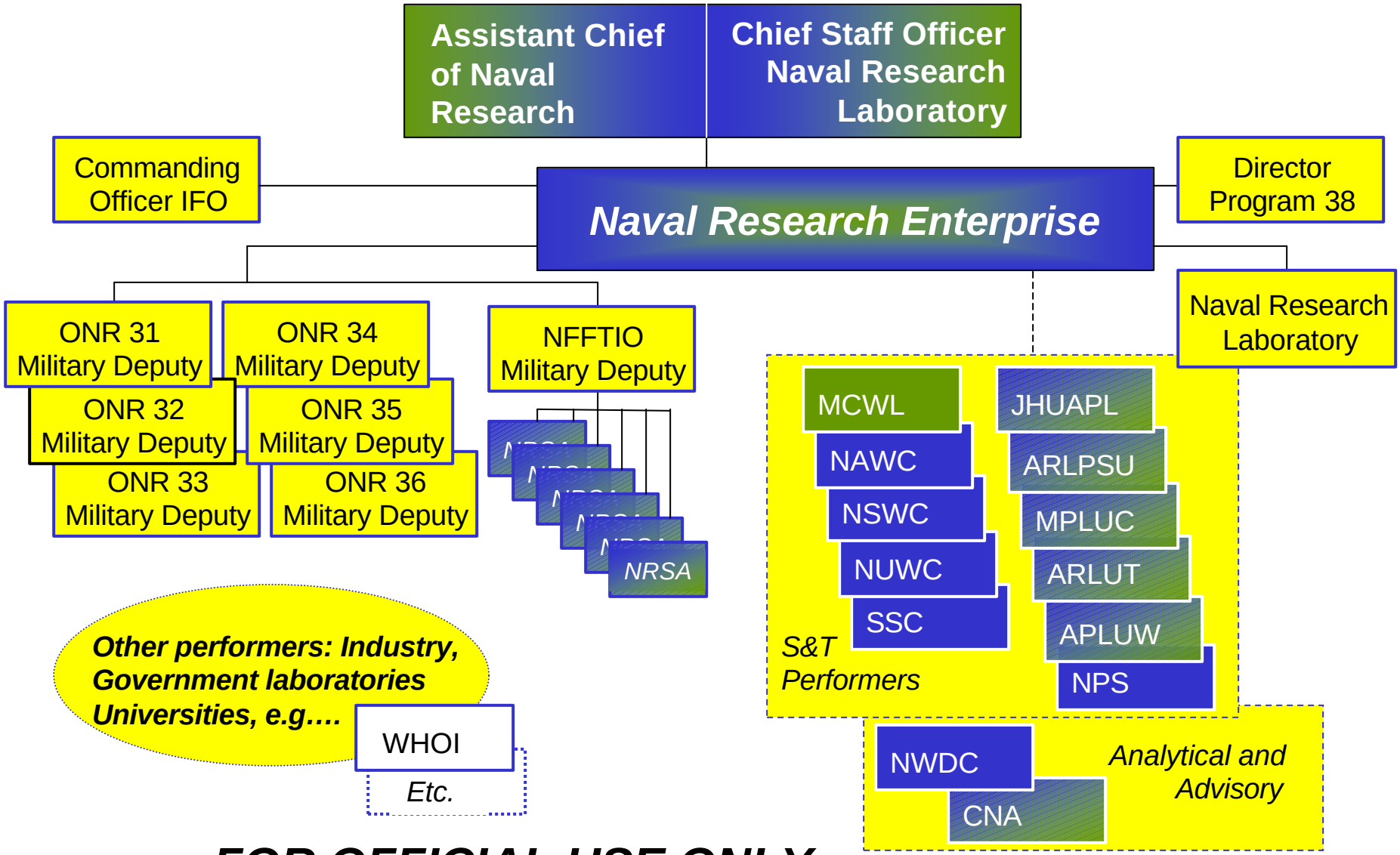
Process Length: Initial estimate from submission to funding a project is 40 working days (2 months) assuming all criteria for initiating a project are met.

Project Scope & Length: Cost of an average effort is envisioned at between $50-200K and no more than 12 months in duration. Longer efforts will need to be folded into FNC process or other avenues.

Feedback: to our customer is critical; therefore, every effort will be made to keep the customer in the loop from initial submission, through the decision process and project execution

FOR OFFICIAL USE ONLY

Naval S&T Crisis Action Team



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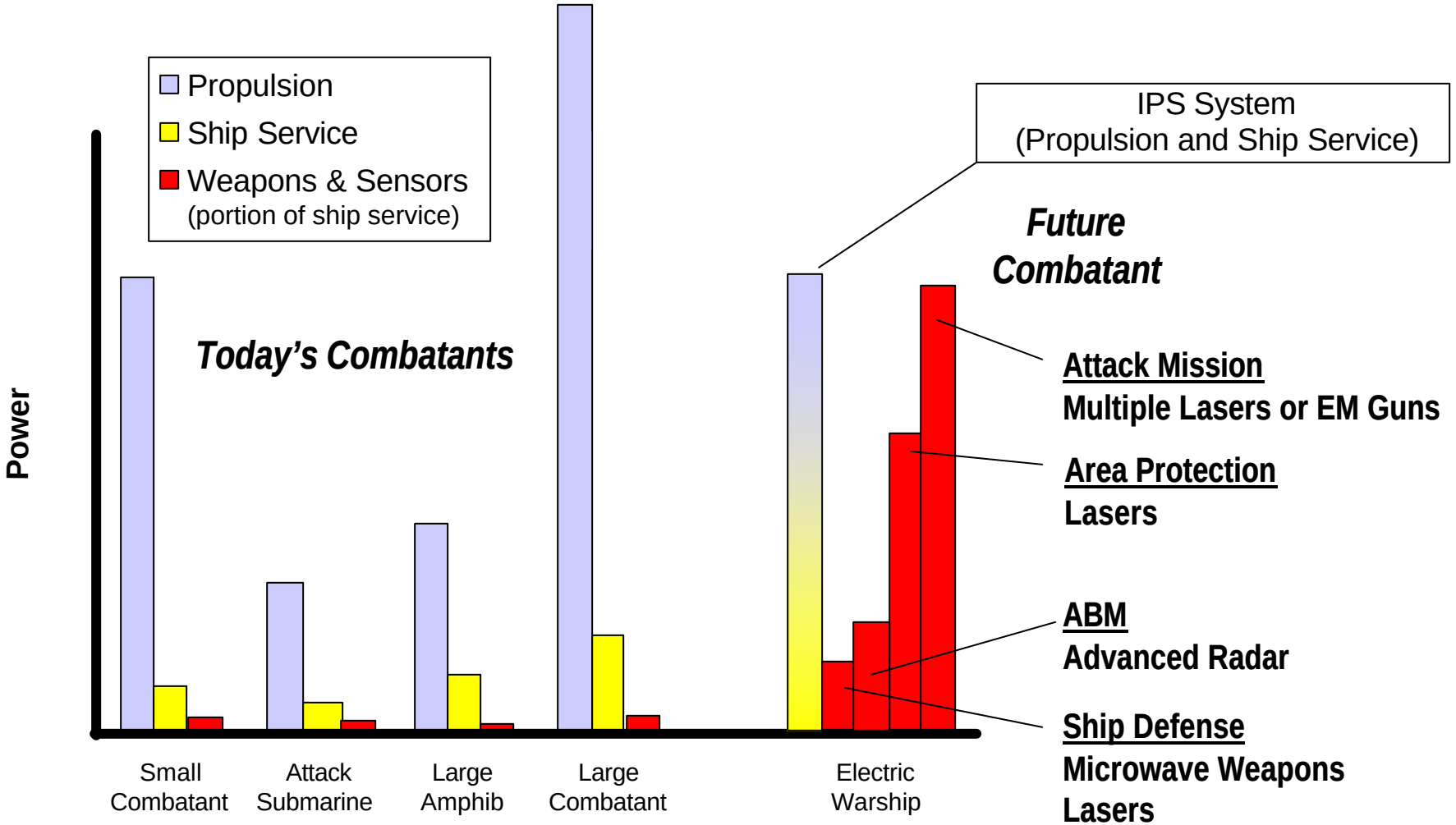
CNR's Transformation Initiatives

- Electric Warship and Directed Energy Weapons
- High Speed/Littoral Vessels
- Revolution in Training
- Hypersonic Strike Weapon
- UCAV
- Naval Space Utilization
- Force Protection Initiatives

Why an Electric Warship?



Overwhelmingly Higher Electrical Needs!

Electric Warships

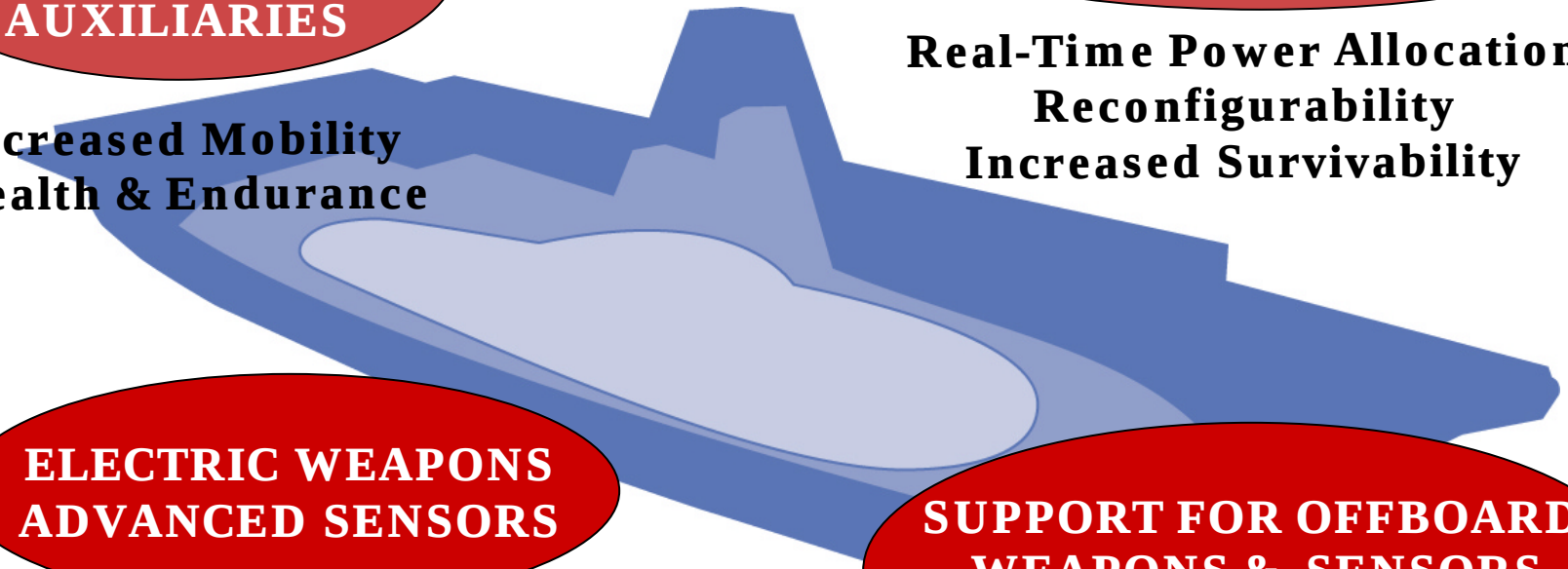
Enable the Electric Naval Force

ELECTRIC PROPULSION & AUXILIARIES

Increased Mobility
Stealth & Endurance

ELECTRIC POWER SYSTEM

Real-Time Power Allocation
Reconfigurability
Increased Survivability



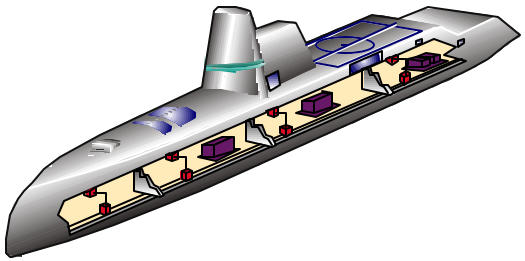
ELECTRIC WEAPONS ADVANCED SENSORS

Increased Firepower
Range & Resolution

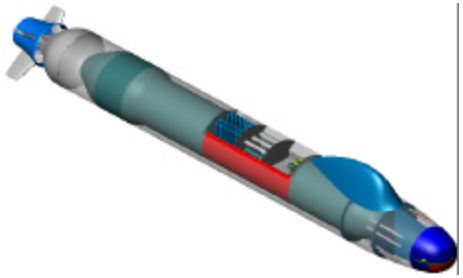
SUPPORT FOR OFFBOARD WEAPONS & SENSORS AND FORCES ASHORE

Increased Reach &
Warfighter Sustainment

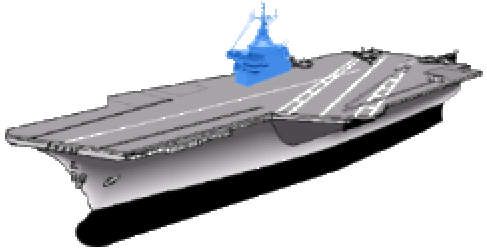
Towards an All-Electric Naval Force



- Podded Propulsion
- Fuel Cells
- High Pulsed Power Sensors
- High Energy / Speed of Light Weapons



- Electric Propulsion
- Replace Diesel and Battery
- Control Surfaces
- Weapons Launch



- Aircraft Launch and Recovery
- Speed of Light Defensive Weapons
- Advanced Survivability Systems
- Advanced Storage and Distribution

- Hybrid Propulsion
- Enhanced Stealth
- Pulsed Power Weapons and Sensors

High Speed Vessels
Littoral Surface Craft (Experimental)

- ASW/MCM/ASUW (Small Craft) Mission Areas
- CEC Node

(1) As Designed:

- ~ 400 T light weight / 750 T full load
- 50 Kts top speed / 20 Kts sustained
- All Aluminum construction
- Gas turbine / water jet propulsion
- Self-deployable (~4000 Nmi)
- Detachable underwater body
- Minimal crew

(2) Potential re-design:

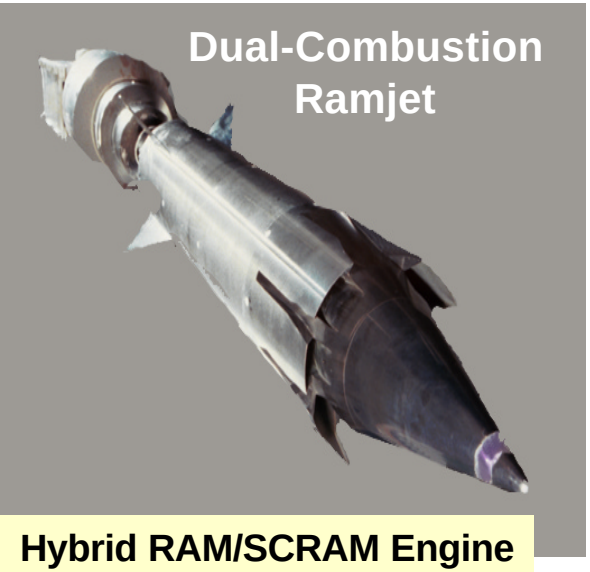
- >1000 T full load
- > 50 Kts top speed goal
- Aluminum hull / composite superstructure
- Gas turbine / water jet propulsion
- Self-deployable (~4000 Nmi)
- Detachable underwater body
- Minimal crew

- Option (1) cost ~$37M* (6.3) + 10% (6.4)
- Option (2) cost ~$80M*

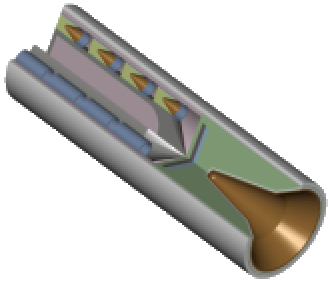
* Does not include mission payload costs

Hypersonic Strike Weapon

PAYOFF:Defeat of Time Critical Threats, High Valued Buried Targets 7 Min to 400 nmi 9.5 Min to 600 nmi



Hybrid RAM/SCRAM Engine
- Mach4-6 SCRAM
- Low Take-Over RAM Start
Only Configuration that Meets Navy Constraints

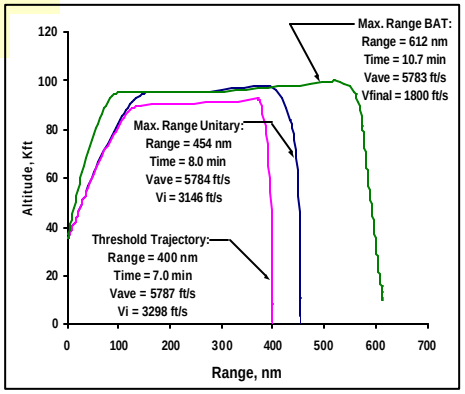


Detonation Merging
Follow-Thru Warhead

Demonstrated Heavyweight Engine-FY01
Demonstrated Fab of High Temp Materials-FY00

Plan consistent with National Hypersonics S&T
Plan consistent with N78 FY06 AOA

LEVERAGES DARPA ARRMD & ONR INVESTMENTS

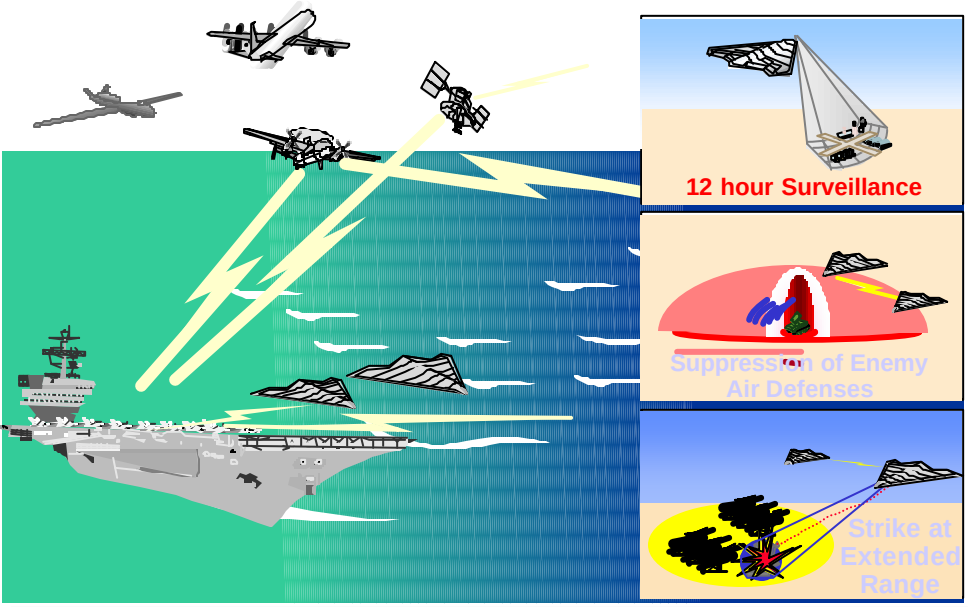


Flight Weight Combustor Demo-FY02
Sled BAT Deployment-FY02
Flight demo Mach4 Cruise & Dispense- FY04
Flight Demo Mach6 flight- FY05
Dispense & High Speed Impact-FY05
Weapon system demo, produce -FY06

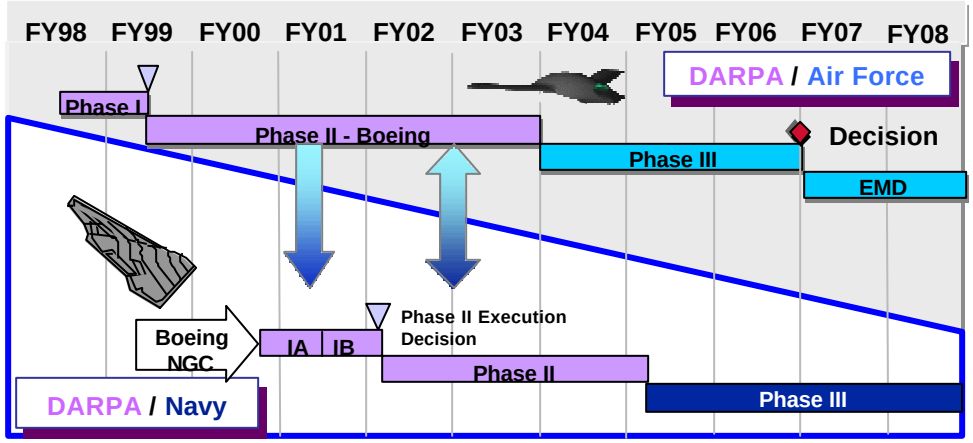
FUNDING THRU SYSTEM DEMO

FY02	FY03	FY04	FY05	FY06	
$20M	$20M	$35M	$27M	$10M	ONR FUNDING
$15M	$20M	$20M	$15M	$ 0	DARPA FUNDING

Naval Unmanned Combat Air Vehicle
(Time Critical Strike Future Naval Capability)



- **New Paradigm in Air System Affordability**
  - Reduced Acquisition Costs (URF<1/3 JSF)
  - Dramatically Lower O&S Cost (>50% Reduction)
- **Mission Effectiveness**
  - Reduced Cost per Kill
  - Reduction in Manned Aircraft Losses
  - Enhanced Battlefield Awareness
- **Naval Integration**
  - Mission Planning and Control
  - Routine Daily Operations



0602122N	1.5M	1.5M					
0603114N			15M	25M	25M	10M	
DARPA		25M	27M	25M	13M		

Carrier Capable
Arresting Hook
Launch Bar
Structure
Flying Qualities

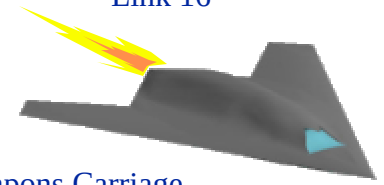
Communications
LOS UHF w/relay
Inter-vehicle DL
MILSTAR
Link 16

12 hour endurance

Low Signature

High Subsonic Speed

Surveillance Sensors
Radar
ESM
EO/IR



Internal Weapons Carriage
JDAM
BLU-109
Small Diameter Bomb
2 internal weapons bays w/4,000lb capacity

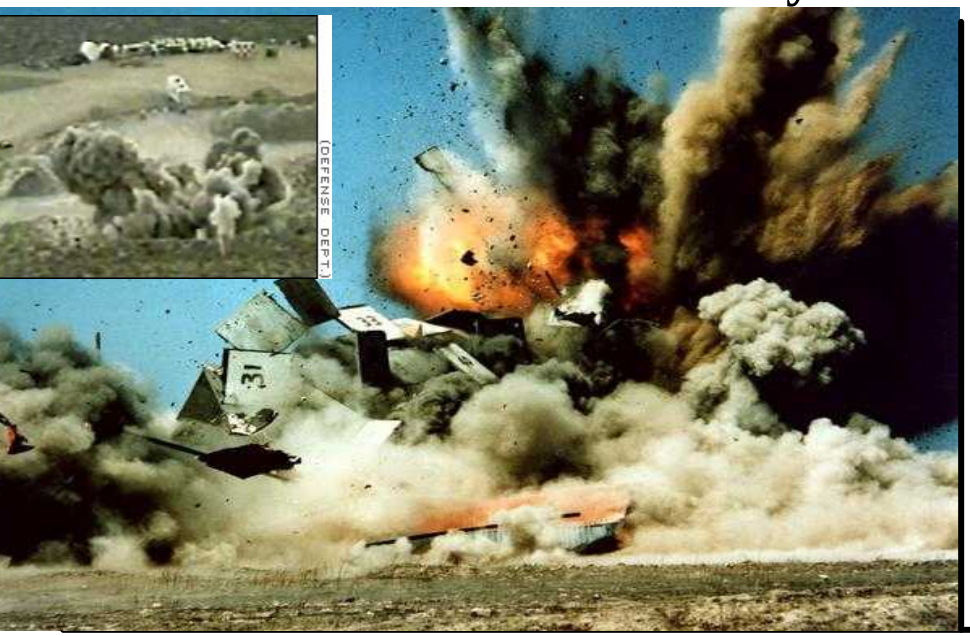
Designed for routine ops, not long-term storage

Combating Terrorism Technology Task Force (CT3F-"Team Tango")

- DDR&E's CT3F—"Team Tango"—develops integrated DoD technology plan to combat terrorism:
  - Deterrence, Indications & Warnings.
  - Survivability & Denial.
  - Consequence Management & Recovery.
  - Attribution & Retaliation.
- ONR represents the Navy and Marine Corps.
- Naval Research Enterprise fully engaged.
- ***Stable***, ***balanced***, ***integrated*** S&T portfolio pays immediate dividends as OSD selects Naval programs:
  - ***8 of 23 near-term deliverables are Naval efforts.***
  - ***5 of 15 mid-term deliverables are Naval efforts.***
  - ***12 of 38 long-term deliverables are Naval efforts.***

THERMOBARIC BOMB DEMONSTRATION

60 Day Team Tango Effort



Results

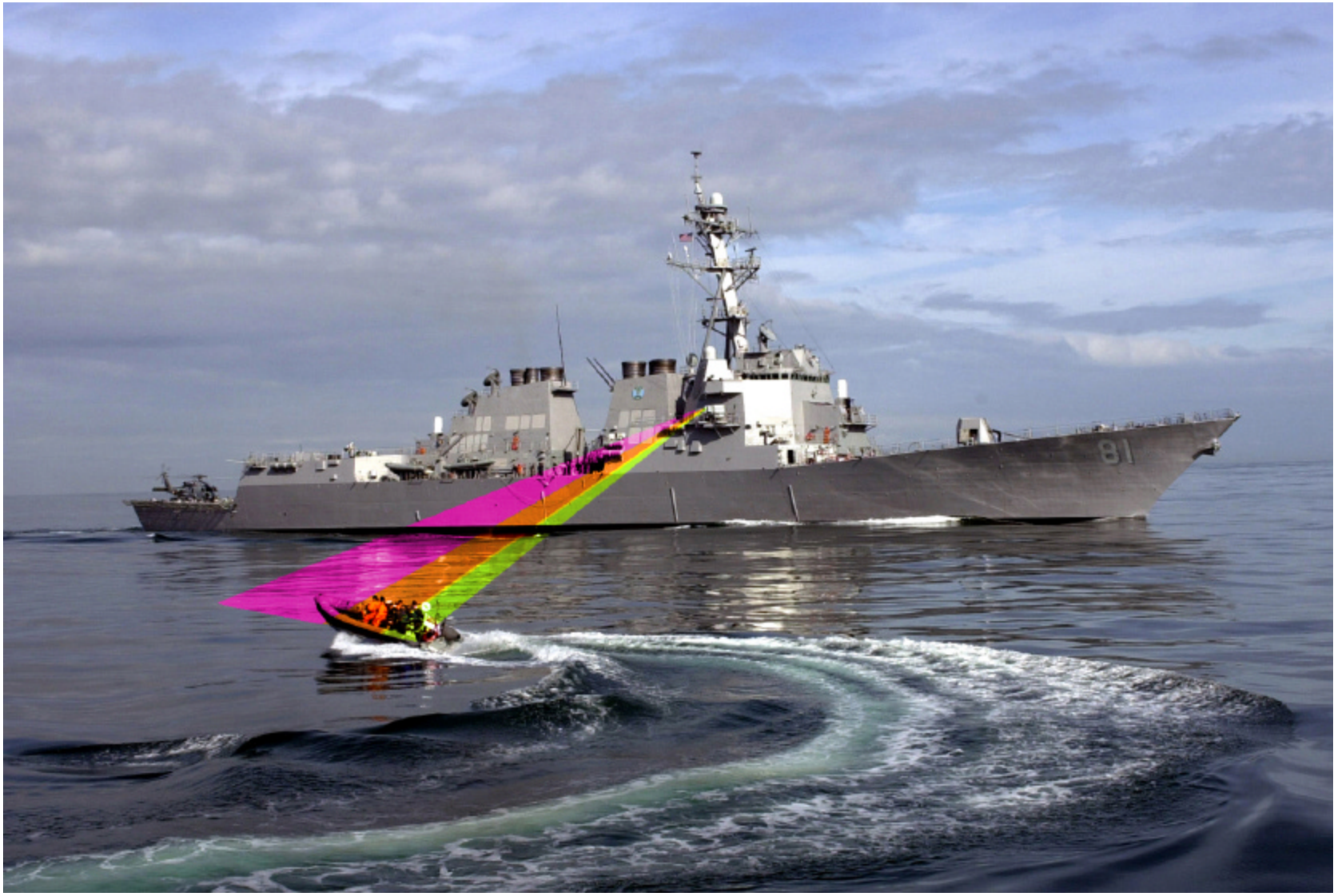
- Full up testing against Tunnel
  - Thermobaric (PBXIH-135) vs Tritonal
- Thermobaric Weapon exhibited significant enhancement in lethal range down length of tunnel
  - Sustained Overpressure Achieved by Prolonged Reaction of Explosive

Multi-Agency Execution

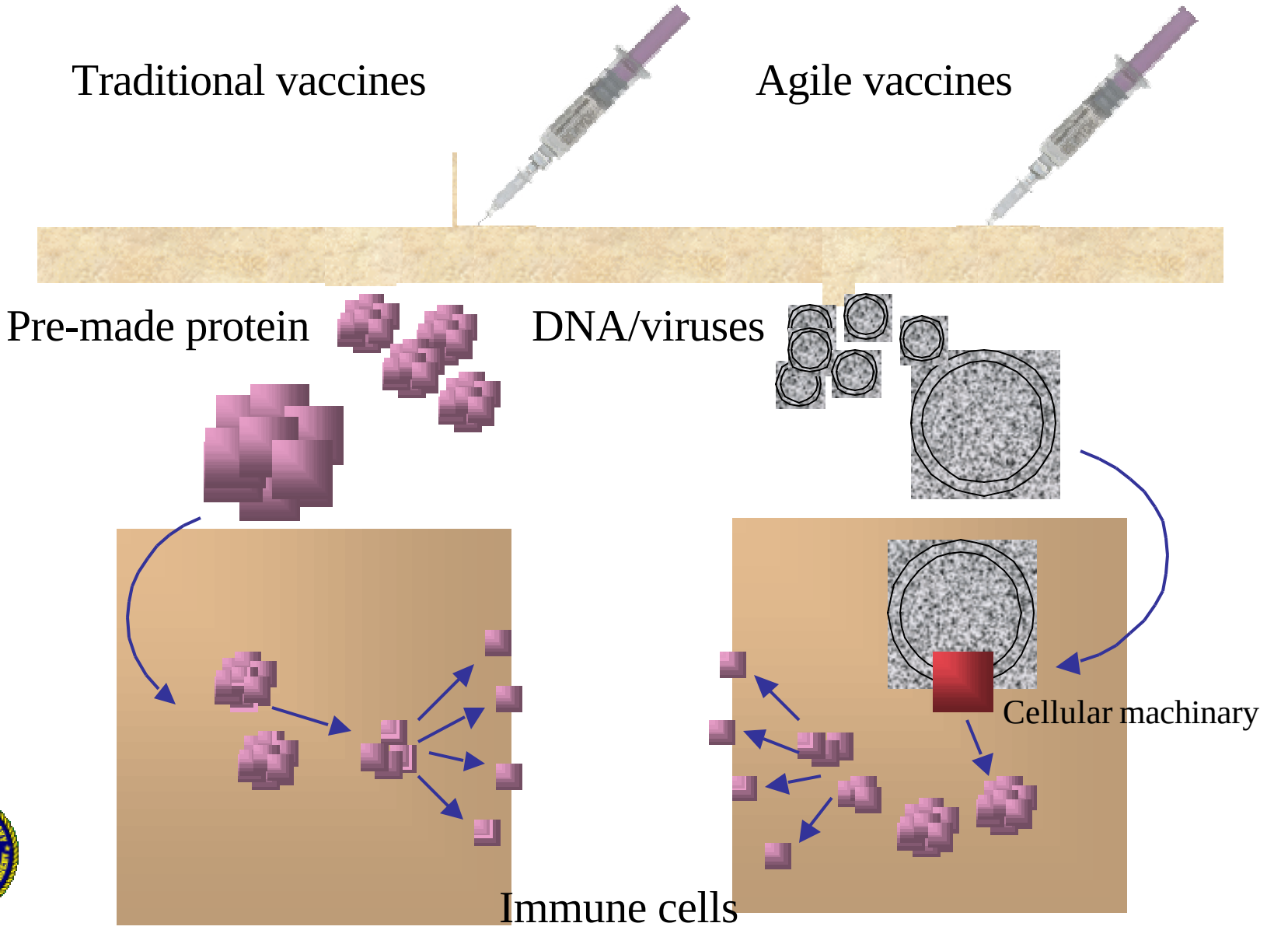
- DTRA Lead/Management
- Navy Developed/ Processed/ Loaded Explosive Fill (PBXIH-135)
  - NSWC Indian Head Division
- Weaponization, Warhead, and Fuzing
  - Eglin Air Force Base Weapons Directorate
- Aircraft Targeting, Weapon Delivery, Warhead Lethality Demonstrated
  - DOE Nevada Test Facilities

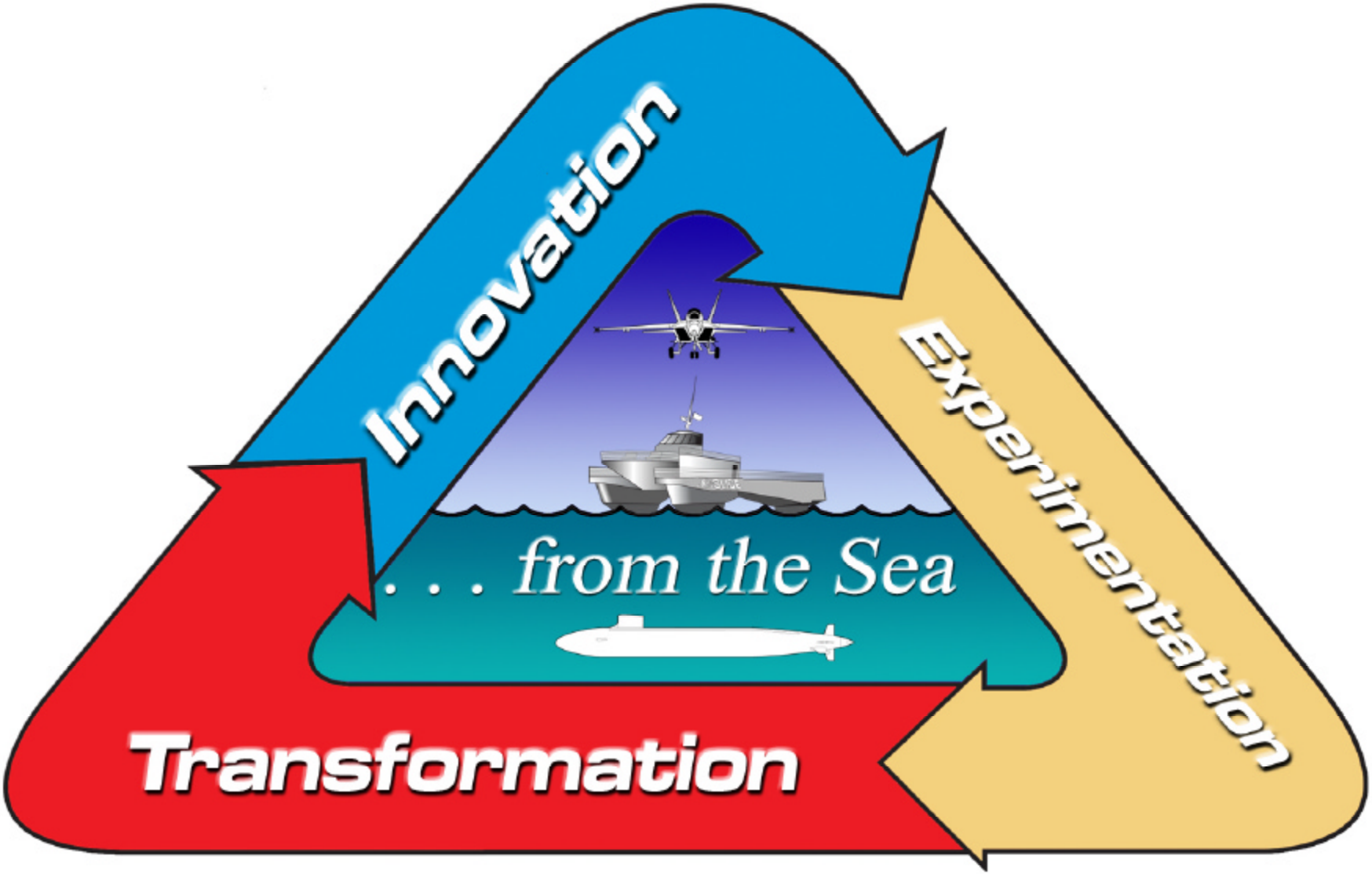
Ten Thermobaric Weapons Delivered - Designated BLU-118/B

Protection of High-Value Afloat Assets

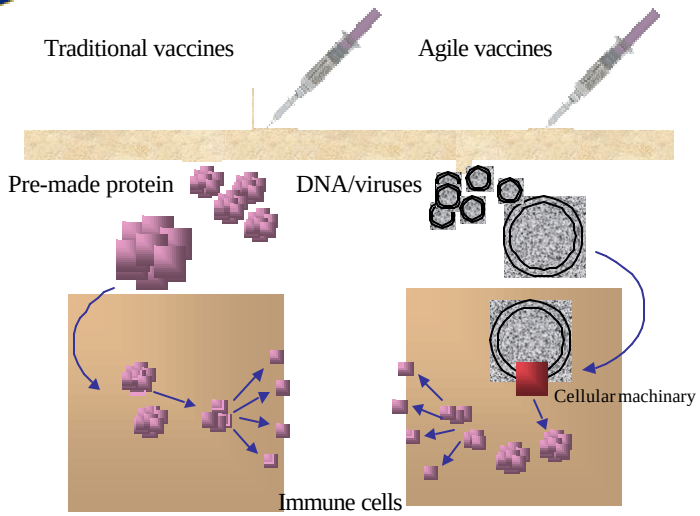


Agile Vaccines for Force Protection




Innovation
Experimentation
. . . from the Sea
Transformation

Agile Vaccines for Force Protection



Objective:

Rapid development of agile, stable, safe and effective vaccines against indigenous and exotic pathogens for the deployed warfighter.

Payoffs:

- A technological leap forward for rapid vaccine development.
- A coordinated program of partners from federal government, academia and industry.
- Identification & optimization of critical vaccine technologies.
- Solutions for vaccines against emerging and genetically modified threats, for homeland defense and in-theater vaccine capabilities.

Concept Description:.

- DNA-based technologies for greatly accelerated vaccine development over traditional vaccines.
- Provides for in-theater immunization for protection of forward deployed warfighter.
- Component of a National Agile Vaccine Task Force (DoD, FDA, CDC, NIH, NSF, academia and industry).

Funding ($M):

	FY02	FY03	FY04	FY05
Current:	8.5	--	--	--
Accelerated:	10	15	20	20

Deliverables:

- Memorandum of Understanding between Navy and the NIAID/NIH.
- First generation DNA-based vaccine in 18 months.
- In-theater threat vaccination capability.
- Rapid vaccine response capability to current, emerging or genetically-modified pathogen threats.

POC's:

Ms. Christine Eisemann, ONR 341, 703-696-2660, eisemac@onr.navy.mil

CAPT Daniel J. Carucci MC, USN; NMRC; 301-319-7570; caruccid@nmrc.navy.mil

RDML Steven E. Hart, MC, USN; BUMED 202-762-3462; sehart@us.med.navy.mil